

Chrisp Compact VNIR/SWIR Imaging Spectrometer Development

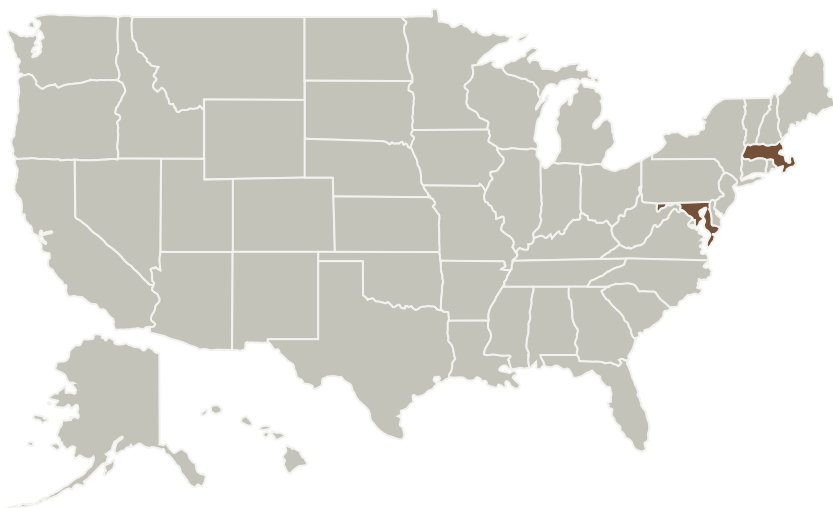
Completed Technology Project (2017 - 2018)



Project Introduction

This proposal addresses the development of a compact, but highly performing, imaging spectrometer for space-based missions in the solar reflective spectral range. An initial design shows great promise but requires demonstration, particularly in the areas of micro-lithographic optical elements and for stray light control. We propose a design with a minimum of 1500 spatial samples with 200 spectral bands over the 400 nm to 2400 nm range. The imaging spectrometer volume is approximately 7.6 cm x 7 cm x 5.4 cm prior to packaging. The design is highly performing in both aberration control and in signal-to-noise performance. The purpose of this proposal is to develop a breadboard spectrometer that utilizes a catadioptric lens and a dual-faceted immersion grating. The later is a significant simplification when compared to the current standard forms, such as the Dyson or Offner forms, that require powered gratings. The breadboard will demonstrate the design and enable a quantitative assessment of the performance and of stray light contamination. This last is critical if an imaging spectrometer is to meet the stringent scientific requirements necessary for the climate change mission. The small size will also facilitate the temperature control of the spectral imager for long-term calibration stability. The design is suitable for both a small satellite platform or an unmanned aerial vehicle of modest size. The design represents a considerable reduction in size and mass compared to current designs and it is expected to also reduce risk due to its simplicity.

Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|--|-------------------|------------|--------------------------|
| Massachusetts Institute of Technology Lincoln Laboratory(MIT-LL) | Lead Organization | R&D Center | Lexington, Massachusetts |

| Primary U.S. Work Locations | |
|-----------------------------|---------------|
| Maryland | Massachusetts |

Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Lead Organization:

Massachusetts Institute of Technology Lincoln Laboratory (MIT-LL)

Responsible Program:

Instrument Incubator

Project Management

Program Director:

Pamela S Millar

Program Manager:

Parminder S Ghuman

Principal Investigator:

Ronald B Lockwood

Co-Investigators:Kenneth Diest
David M Pronchick
Kurtis J Thome
Michael Chrisp

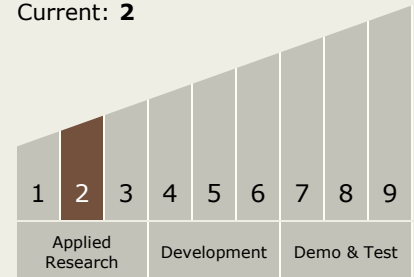
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Technology Maturity (TRL)

Start: 2
Current: 2



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destination

Earth